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**BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

Paper No. 15

Application Number: 09/622,405
Filing Date: August 17, 2000
Appellant(s): GREENAWAY ET AL.

Stanley C. Spooner
For Appellant

**EXAMINER'S ANSWER**



This is in response to the appeal brief filed 05 May 2003.

***(1) Real Party in Interest***

A statement identifying the real party in interest is contained in the brief.

***(2) Related Appeals and Interferences***

A statement identifying the related appeals and interferences which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief.

***(3) Status of Claims***

The statement of the status of the claims contained in the brief is correct.

***(4) Status of Amendments After Final***

No amendment after final has been filed.

***(5) Summary of Invention***

The summary of invention contained in the brief is correct.

***(6) Issues***

The appellant's statement of the issues in the brief is correct.

***(7) Grouping of Claims***

The rejection of claims 1-4, 6-8, 10-12, 15-18, 20 and 21 stand or fall together because appellant's brief includes a statement that these claims stand or fall together and provides reasons in support thereof. See 37 CFR 1.192(c)(7).

***(8) Claims Appealed***

The copy of the appealed claims contained in the Appendix to the brief is correct.

***(9) Prior Art of Record***

| | | |
|---|---|---|
| U.S. 5,526,336 | Park et al. | 06-1996 |
| U.S. 5,684,762 | Kubo | 11-1997 |
| U.S. 5,930,220 | Shimano et al. | 07-1999 |
| U.S. 5,721,629 | Lee | 02-1998 |
| U.S. 3,861,784 | Torok | 01-1975 |

***(10) Grounds of Rejection***

The following ground(s) of rejection are applicable to the appealed claims:

***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1, 4, 7, 8, 11-12, 15-18, 20 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kubo U.S. Patent 5,684,762 in view of Shimano et al. U.S. Patent 5,930,220.

In regard to claims 1 and 15, Kubo discloses (see Figure 2) an apparatus for producing simultaneously a plurality of spatially separated images from an object plane or field comprising an optical system (26, 28) arranged to produce an image associated with a first focus condition; a diffraction grating (27) arranged to produce, in concert with the optical system, images associated with each diffraction order as shown in Figures 2 and 5 and means for detecting the images (29), wherein the optical system, diffraction

grating and detecting means are located on an optical axis ("O" as shown in Figure 2) and the diffraction grating is located in a suitable grating plane (as shown in Figure 2) and the diffraction grating is distorted according to a quadratic function as described in column 4, lines 55-63 so as to cause the images to be formed under various focus conditions and said images spatially separated in a direction having a non-zero component perpendicular to the optical axis as is shown in the right side of Figure 2.

In regard to claim 4, Kubo discloses that the origin of the distortion function of the diffraction grating is displaced from the optical axis as described in column 4, lines 39-63 and as shown in Figure 11.

In regard to claim 7, Kubo discloses that the diffraction grating is any one of an amplitude-only diffraction grating, a phase only diffraction grating or a phase and amplitude diffraction grating as described in column 4, lines 28-38.

In regard to claim 11, Kubo discloses that the diffraction grating is a reflective grating or a transmissive grating as described in column 4, lines 28-38 and as shown in Figure 2.

In regard to claim 12, Kubo discloses the grating is any of a two-level (binary) structure, a multi-level (digitised) structure or a continuous-level (analogue) structure as described in column 4, lines 38-54.

Regarding claim 20, Kubo discloses a wavefront analyzer including an apparatus for producing simultaneously a plurality of spatially separated images from an object field as described in column 2, lines 7-29 and as shown in Figure 2.

Regarding claim 21, Kubo discloses a passage ranging device including an apparatus for producing simultaneously a plurality of spatially separated images from an object field as described in column 2, lines 7-29 and as shown in Figure 2.

However, in regard to claims 1 and 15, Kubo does not teach that the apparatus produces the plurality of spatially separated images from a plurality of object planes or that the apparatus is adapted for producing substantially in focus images in a common image plane from a plurality of object planes. Nor in regard to claim 8 does Kubo teach that the diffraction grating is polarization sensitive.

In regard to claim 1, Shimano et al. does teach that the apparatus produces the plurality of spatially separated images in a common image plane from a plurality of object planes as shown in Figure 9.

Regarding claim 8, Shimano et al. teaches that the diffraction grating is polarization sensitive as described in column 5, lines 1-7.

Regarding claim 16, Shimano et al. teaches that the object planes are coincident with the image planes as shown in Figure 9.

Regarding claim 17, Shimano et al. teaches where each object plane contains an array of elements, capable of existing in at least two states and in which the detector means is capable of distinguishing between said states as shown in Figure 3. Inherently, each object plane contains elements (i.e., lands and pits), which exist in two states (1 or 0).

Regarding claim 18, Shimano et al. teaches reading data from a three dimensional optical storage medium wherein object planes are located within the

medium and the detecting means is capable of producing a signal dependent on the state of the elements as shown in Figure 3 and as described in column 8, lines 46-59.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize the elements of Shimano in the device of Kubo in order to read information from different object fields corresponding to different optical recording media (i.e., CD or DVD).

3. Claims 2, 3 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kubo U.S. Patent 5,684,762 in view of Shimano et al. U.S. Patent 5,930,220 in view of Lee U.S. Patent 5,721,629.

In regards to claims 2 and 3, the combination teaches the invention as set forth above but does not teach that the function according to which the grating is distorted includes further terms for producing different amounts of spherical aberration in the images associated with each diffraction order nor does the combination teach that the spherical aberration of images associated with each diffraction order is arranged to correct for spherical aberration associated with the different depths of substantially parallel planes in object or image space. Lee teaches that the function according to which the grating is distorted includes further terms for producing different amounts of spherical aberration in the images associated with each diffraction order as described in column 3, lines 35-67. Lee also teaches that the spherical aberration of images associated with each diffraction order is arranged to correct for spherical aberration associated with the different depths of substantially parallel planes in object or image space as described in column 3, lines 35-52. It would have been obvious to one having

ordinary skill in the art at the time the invention was made to modify the grating of Kubo to correct for spherical aberration as taught by Lee in order to compensate for the spherical aberration caused by the different thicknesses of the optical disk media.

In regard to claim 6, the combination teaches the invention as set forth above but does not teach that the diffraction grating comprises a set of two or more diffraction gratings designed such that the various diffraction orders are spatially separated. Lee does teach (see Figures 7A, 7B, 7C) that the diffraction grating comprises a set of two or more diffraction gratings (27a, 28a) designed such that the various diffraction orders are spatially separated as described in column 3, lines 35-50. It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the combination to incorporate the features of the grating as taught by Lee so that the grating exhibits low aberration.

4. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kubo U.S. Patent 5,684,762 in view of Shimano et al. U.S. Patent 5,930,220 in view of Torok U.S. Patent 3,861,784.

In regard to claim 10, the combination teaches the invention as set forth above but does not teach that the diffraction grating is a programmable grating.

Torok teaches a diffraction grating that is programmable as described in abstract.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize the programmable grating as taught by Torok in the invention of Kubo in order to provide selectivity of foci for different diffraction orders due to variation in layer thickness of the optical media.

***(11) Response to Argument***

Appellant's arguments filed 05 May 2003 have been fully considered but they are not persuasive.

The Appellant argues that no prior art reference teaches the diffraction grating claimed in independent claims 1 and 15 in that both claims require that the diffraction grating be "distorted according to a quadratic function so as to cause the images to be formed under various focus conditions from a plurality of different object planes and said images spatially separated in a direction having a non-zero component perpendicular to the optical axis" as shown in Appellant's Figure 10. This figure shows a plurality of objects located at different object planes 5, 6 and 7 with the diffraction grating being distorted according to a quadratic function so that the resultant images are formed spatially separated in a direction perpendicular to the optical axis. The Appellant goes on to state that the Examiner has failed to establish a *prima facie* case of obviousness with respect to the claimed diffraction grating and in particular, with a diffraction grating distorted according to a quadratic function to cause images form a plurality of different object planes to be spatially separated with at least a component perpendicular to the optical axis. Specifically, the Appellant states that the prior art, Kubo uses only a single object plane as shown in Figures 2, 3, 5 and 13 whereas claims 1 and 15 require a "plurality of different object planes" such that the diffraction grating provides "images spatially separated in a direction having a non-zero component perpendicular to the optical axis" and thus Kubo fails to teach the structure of the claimed diffraction grating.

In response to this argument, the Appellant is reminded that the prior art rejection as applied is Kubo in view of Shimano et al and not Kubo individually. Appellant is reminded that one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

The Appellant further argues that the combination of Kubo and Shimano et al does not teach a diffraction grating distorted according to a quadratic function to cause images form a plurality of different object planes to be spatially separated with at least a component perpendicular to the optical axis as claimed. Specifically, Figure 9 of Shimano shows two different object planes which have images which are spatially separated perpendicular to the optical axis. However, Shimano teaches a dual focal point lens 73 which provides for the image from two separate object planes and then this image is processed by hologram 731 and polarizing type diffraction grating to create the spatially separated images 12. Therefore, there is no teaching that a single diffraction grating distorted in accordance with a quadratic function could cause such spatial separation in the images.

In response to this argument, the Appellant is again reminded that one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). The rejection is not based upon what Kubo or Shimano teach individually but on what the

combination teaches. Kubo teaches (see Figure 2) a diffraction grating distorted according to a quadratic function so as to cause the images to be formed under various focus conditions *from a specific object plane* and wherein said images are spatially separated in a direction having a non-zero component perpendicular to the optical axis. Shimano teaches an apparatus for producing a plurality of spatially separated images from a *plurality of object planes* in order to solve the problem of reading information from different thickness layer (i.e., different object planes) optical media.

The Appellant further argues that the prior art references do not provide proper motivation or reasons for combining structures disclosed in the manner of Appellant's claims. Specifically Kubo is not directed to the problem of imaging a three-dimensional object or imaging something from a plurality of object planes but rather is directed towards being able to focus a laser on a single object plane and to maintain that focus even if that object plane changes position thus Kubo has nothing to do with being able to read multilevel media as claimed.

In response to the Appellant's arguments, the Appellant is again reminded one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). The issue is not what Kubo teaches individually but rather what the combination of Kubo in view of Shimano teaches.

The Appellant then argues that Shimano teaches an apparatus which can read object material from different object planes as shown in the specific embodiments in Figures 6 and 7 but not simultaneously.

In response to Appellant's argument, the Examiner would point out that in the Office Action, the Examiner makes specific reference to Figure 9 in formulating the obviousness rejection on the claim recitation of reading object material from two different object planes simultaneously and not Figures 6 and 7.

The Appellant further argues that Shimano teaches an apparatus as shown in Figure 9 which will read from two object planes simultaneously using three elements (two-focal points lens 73, hologram 731 and polarizing type diffraction grating 5) to create images which are spatially separated but that Shimano does not teach a diffraction grating which will cause images to be formed from a plurality of object planes wherein the images are spatially separated in a direction perpendicular to the optical axis.

In response to this argument, the Appellant is reminded that the rejection is not based upon what Shimano teaches individually but on what the combination of Kubo in view of Shimano teaches. Kubo teaches (see Figure 2) a diffraction grating distorted according to a quadratic function so as to cause the images to be formed under various focus conditions *from a specific object plane* and wherein said images are spatially separated in a direction having a non-zero component perpendicular to the optical axis. Shimano teaches an apparatus for producing a plurality of spatially separated images

from a *plurality of object planes* in order to solve the problem of reading information from different thickness layer (i.e., different object planes) optical media.

The Appellant then argues that there is no reason or motivation for combining the two references. Kubo is an auto-focus device attempting to focus a beam or image from a single object plane and there is no reason to combine it with Shimano which is designed to read two different types of media. Shimano does attempt to perform detection as claimed in appellant's independent claims but does so with three elements (two-focal points lens 73, hologram 731 and polarizing type diffraction grating 5) instead of the distorted grating in accordance with the Appellant's claims.

In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, the Examiner would like to point out that both Kubo and Shimano are similar apparatus (optical disk head), which both have detecting means (29 in Kubo, 12 in Shimano) for proper positioning of the beam spot for focusing the images under various focus conditions. Furthermore, both Kubo and Shimano teach that said images are spatially separated in a direction having a non-zero component perpendicular to the optical axis as shown in Figures 2 of both Kubo and Shimano. Kubo teaches all of the limitations except for

producing a plurality of spatially separated images from a *plurality of object planes*. However, Shimano does teach producing a plurality of spatially separated images from a *plurality of object planes* for proper positioning of the beam spot for focusing the images under various focus conditions in order to read optical data on different thickness layer (i.e., different object fields) optical storage media as described in column 3, lines 20-26 of Shimano which states, "... provide means for reducing an offset of a tracking signal which is inexpensive and which is capable of readily carrying out detection of the focal point deviation signal and of being applied to optical disks having different substrate thicknesses".

The Appellant further argues that the Kubo and Shimano references would actually lead one of ordinary skill in the art away from appellant's claimed combination of elements. Kubo teaches a single object plane and an auto-focus system with a diffraction grating and thereby would lead one of ordinary skill in the art away from attempting to form images from a plurality of different object planes. The Shimano reference would lead one of ordinary skill in the art away from appellant's claimed combination of elements because it teaches that in order to image different object planes and to form images that are spatially separated, one requires not only a diffraction grating but a dual focus lens 73 and a hologram 731.

In response to appellant's argument that the Kubo and Shimano references would actually lead one of ordinary skill in the art away from appellant's claimed combination of elements, the appellant has not presented any arguments as to why the proposed combination would render the prior art unsatisfactory for its intended purpose

or change the principle of operation of the references. The Examiner would point out both Kubo and Shimano are similar apparatus (optical disk head), which both have detecting means (29 in Kubo, 12 in Shimano) for proper positioning of the beam spot for focusing the images under various focus conditions for the purpose of reading optical data of optical storage media. As for the argument, that Shimano teaches multiple elements (dual focus lens, hologram) in order to image different object planes, the Examiner would point out that it is not what each reference teaches individually but what the combination teaches. Kubo teaches an optical head apparatus comprising a diffraction grating distorted according to a quadratic function so as to cause the images to be formed under various focus conditions *from a specific object plane* and wherein said images are spatially separated in a direction having a non-zero component perpendicular to the optical axis. Shimano teaches an apparatus for producing a plurality of spatially separated images from a *plurality of object planes* in order to solve the problem of reading information from different thickness layer (i.e., different object fields) optical data storage. Both references operate on the same principle of operation since both are optical head apparatus and both track light signals via a detection element in order to focus the images under various focus conditions in order to read optical data on different thickness layer (i.e., different object planes) optical media. For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

ava
July 14, 2003

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